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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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Hye Young Kim

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03/30/2006

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EXAMINER

QI, ZHI QIANG

ART UNIT

PAPER NUMBER

2871

DATE MAILED: 03/30/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

RD

| | | | |
|------------------------------|------------------------|---------------------|--|
| Office Action Summary | Application No. | Applicant(s) | |
| | 10/029,144 | KIM ET AL. | |
| | Examiner | Art Unit | |
| | Mike Qi | 2871 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 24 February 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,3,6-13,15-18,22 and 23 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 1,3,6-13 and 15-18 is/are allowed.
- 6) ☒ Claim(s) 22 and 23 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 22 and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over US 6,001,539 (Lyu et al) in view of US 5,135,581 (Tran et al), US 5,628,933 (Carter et al) and US 6,433,842 (Kaneko et al).

Regarding claims 22 and 23, Lyu discloses (col.1, lines 20-67; Fig. 2) that forming method of an LCD comprising:

- a substrate (11);
- a switching device (TFT) for driving the pixel electrode over the substrate (11);
- depositing a protective film (passivation layer 15 and 10) over the substrate (11) to cover the switching device;
- defining a contact hole in the protective film (15,10) to expose the drain electrode (34) of the switching device;
- forming pixel electrode (12) to connect the drain electrode (34) via the contact hole.

Lyn does not explicitly disclose that:

- 1) the pixel electrode is formed by placing the substrate in a vacuum chamber

and injecting hydrogen-containing gas at a temperature of less than 400 °C, and the substrate has a temperature of less than about 200 °C when forming the pixel electrode;

2) the pixel electrode has an amorphous structure.

Tran discloses (col.2, line 20 - col.4, line 58) forming an electrically conductive oxide composition used as a light transmissive electrode in a device, such as liquid crystal display device, by sputtering at temperature from 20 °C to 300 °C (less than 400 °C) with stabilizing gas such as H₂ or H₂O (hydrogen-containing gas), and preferably the sputter depositing occurs at temperature of from 25 °C to 150 °C. The substrate should be placed in a vacuum chamber, otherwise how can do the sputter depositing process (as an evidence, US 6,466,293 teaches that the substrates were placed in a vacuum chamber, see col.20, lines 8-9). **Tran** further discloses (col.2, line 64 – col.3, line 6) that forming electrode using a room temperature process allows liquid crystal display to be prepared on a supports (substrate) which would otherwise be damaged by high temperature processes (preventing the damage by high temperature processes).

The depositing includes conductive electrodes depositing on a substrate, so that the substrate has a temperature less than 200 °C according to the room temperature process. The pixel electrode also is a conductive electrode. The forming process for a conductive electrode is also suitable for the pixel electrode in order to prevent the damage by high temperature processes. Less than 400°C can be any degree as long as less than 400°C and less than 200°C can be any degree as long as less than 200°C. Such that 150°C would be half of the 300°C, and that the temperature of the substrate is corresponding to half a set temperature of the vacuum chamber.

As evidence, **Cater** discloses (col. 1, lines 31-41; col.4, lines 16-38) that a transparent conductor forming method (deposition process) in which the substrate in a vacuum chamber was heated to 250 °C, and after growth of several thousand angstroms, the chamber was again evacuated and the substrate was permitted to cool to room temperature (i.e., less than 200 °C), and the film subsequently removed from the chamber has good electrical conductivity. According to the specification of the paragraph 0035 of this application, the depositing process allows the substrate temperature to be less than about 200 °C. Therefore, the substrate in the deposition process was also permitted to a cool temperature to be less than 200 °C, and the reference Cater reads this process in which the substrate was permitted to room temperature (less than 200 °C).

Lyn, Tran and Cater teach the invention set forth above except for the pixel electrode has an amorphous structure.

Kaneko discloses (col.5, lines 47 – 51) that the pixel electrode has an amorphous structure, because using amorphous indium tin oxide (ITO) or indium zinc oxide (IZO) as the material of the pixel electrodes allows for use of a weak-acid etchant. Kaneko further discloses (col.9, lines 32 – 43) that by using the weak acid, the layered structure underlying the ITO film is secured from being damaged during the etching of the ITO film.

Therefore, it would have been obvious to those skilled in the art at the time the invention was made to modify the liquid crystal display of Lyn with the teachings of a forming process such as injecting hydrogen-containing gas at a temperature less than

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400 °C and the substrate has a temperature of less than 200 °C and the pixel electrode having amorphous structure with weak acid etchant as taught by Tran, Cater and Kaneko, since the skilled in the art would be motivated for preventing the damage by high temperature processes and securing the electrodes underlying the pixel electrodes from being damaged during etching.

Allowable Subject Matter

3. Claims 1,3, 6-13 and 15-18 are allowed.
4. The following is a statement of reasons for the indication of allowable subject matter:

The prior art of record neither anticipated nor rendered obvious that forming pixel electrode in a liquid crystal display comprises various steps, more specifically, as the following features:

the substrate has a temperature between about 50°C and about 150°C and the substrate temperature being half the temperature of the vacuum chamber [claims 1 and 13].

Response to Arguments

5. Applicant's arguments filed on Feb.24, 2006 have been fully considered but they are not persuasive.

1) The reference Tran discloses (col.2, line 20 - col.4, line 58) forming an

electrically conductive oxide composition used as a light transmissive electrode in a device, such as liquid crystal display device, by sputtering at temperature from 20 °C to 300 °C (less as than 400 °C) with stabilizing gas such as H₂ or H₂O (hydrogen-containing gas), and forming electrode using a room temperature process allows liquid crystal display to be prepared on a supports (substrate) which would otherwise be damaged by high temperature processes (preventing the damage by high temperature processes). Less than 400°C can be any degree as long as less than 400°C and less than 200°C can be any degree as long as less than 200°C. Such that 150°C would be half of the 300°C, and that the temperature of the substrate is corresponding to half a set temperature of the vacuum chamber.

Conclusion

6. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

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7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

1) As an evidence, US 6,466,293 (Suzuki et al) discloses (col.19, line 43 – col.20, line 32) that a LCD forming process in which the substrates precisely superposed and adhered and then were placed in a vacuum chamber.

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mike Qi whose telephone number is (571) 272-2299.

The examiner can normally be reached on M-T 8:00 am-5:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Robert Kim can be reached on (571) 272-2293. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Mike Qi
March 24, 2006


ANDREW SCHECHTER
PRIMARY EXAMINER